

09/689,574

*Sub  
C1  
Cant* *22  
D10* disposing at least one antenna on the exterior of the tubular, each at least one antenna being adapted to transmit and/or receive electromagnetic energy; and electronically steering the sensing direction of the transmitted and/or received electromagnetic energy.

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#### REMARKS

The title has been amended to more clearly reflect the claimed invention. Claims 1-74 are rejected under 35 U.S.C. § 103(a) as obvious over *Clark et al.*, U.S. 6,297,639. Applicants submit that the Office Action misconstrues the claimed invention.

The patent law makes clear that to establish prima facie obviousness, "all the claim limitations must be taught or suggested by the prior art." MPEP 2143.03 (citing *in re Royka* 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974)). *Clark et al.* is deficient in this respect because it does not teach or suggest all the limitations of the claimed invention.

The claimed invention is directed to the monitoring of reservoirs using tubulars adapted for permanent disposal within subsurface formations. The invention also comprises an electronically steerable antenna design that allows for remote and selective directional steering while the tubular is permanently disposed. Claims 11 and 48 have been amended to further clarify this feature of the invention. The invention also comprises a tubular with a slot fully penetrating its wall and having an antenna aligned therewith. *Clark et al.* does not teach or describe tubulars for permanent monitoring operations, nor such tubulars equipped with electronically steerable antennas or such tubulars with slotted regions.

*Clark et al.* teaches shield designs for making directional measurements with logging tools employed in while-drilling operations. To those skilled in the art, in addition to extreme temperatures and pressures, while-drilling tools are subjected to a rugose and abrasive borehole environment, where formation cuttings are likely to damage the tools. Downhole conditions progressively become more hostile at greater depths, which exacerbates degradation of external or exposed components. Fatigue loading (i.e., the bending and rotating of the drill stem) is also an issue in drilling operations. Thus conventional while-drilling tools are not designed with fully penetrating slots since the emphasis is on strength and durability. Moreover, while-drilling tools are not designed for permanent subsurface deployment. They are used specifically for drilling the borehole and withdrawn thereafter.

09/689,574

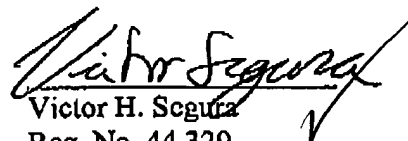
The Office Action states that Fig. 2C of *Clark et al.* describes a selectively steerable antenna (Office Action, page 3). While the disclosed configuration of Fig. 2C does show directed antenna sensitivity, it is not electronically steerable. The configuration of *Clark et al.* utilizes antennas that are physically and permanently set at specific orientations. As such, the antenna's sensitivity is fixed to a particular envelope around the tool. There is no "steering" involved. In contrast, the antennas of the present invention are electronically steerable such that their sensitivity may be altered as desired and the steering can be done remotely.

Expressly missing from *Clark et al.* is any discussion or appreciation for the long term or permanent downhole placement of tubulars for reservoir monitoring. The fact is that prior to Applicants' invention, there were no electronically steerable antenna or slotted tubular/antenna configurations used for permanent subsurface monitoring in the field. Thus, *Clark et al.* does not render the claimed invention obvious under 35 U.S.C. § 103 and the rejections of the pending claims should be withdrawn.

In conclusion, Applicants respectfully submit that claims 11-29, 48-66 and new claims 75-76 are in condition for allowance and passage to issuance is requested. Additionally, Applicants request an initialed copy of the Form PTO-1449 recently submitted with the Supplemental Information Disclosure Statement of June 20, 2002 for the present application. An additional copy of the PTO-1449 is submitted herewith. The Examiner is invited to contact the undersigned attorney at (281) 285-4562 with any questions, comments or suggestions relating to the referenced patent application.

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09/689,574

**APPENDIX A: MARKED-UP VERSION TO SHOW CHANGES MADE**

The material that has been added is underlined. Deleted material is shown bolded and in brackets.

**In the Specification**

In the title:

Method and Apparatus for Subsurface [Measurements with Directional Sensitivity Particularly Adapted for] Reservoir Monitoring With Antennas Mounted on Permanently Disposed Tubulars [Applications]

**In The Claims:**

11. An apparatus for monitoring a characteristic of a reservoir, comprising:
  - a tubular having an elongated body with a longitudinal axis, the tubular being adapted for permanent disposal within a borehole traversing the reservoir;
  - at least one antenna disposed on the exterior of the tubular, each at least one antenna being adapted to transmit and/or receive electromagnetic energy; and
  - means to activate the at least one antenna to electronically [selectively] steer the sensing direction of the transmitted and/or received electromagnetic energy.
  
48. A method for monitoring a characteristic of a reservoir, the reservoir being traversed by a borehole, comprising:
  - disposing a tubular within the borehole, the tubular having an elongated body with a longitudinal axis and adapted for permanent disposal within the borehole;
  - disposing at least one antenna on the exterior of the tubular, each at least one antenna being adapted to transmit and/or receive electromagnetic energy; and
  - electronically [selectively] steering the sensing direction of the transmitted and/or received electromagnetic energy.